

REMARKS

Introduction

Claims 1-19 were originally pending in this application. Claims 1, 12 and 16 have been amended herein. No new matter has been added.

Amendments to the Specification

Paragraph 0027 has been amended to correct a typographical error found on line 7. Reference numeral 36 was inadvertently used to designate the piston pin. The piston pin is designated using reference number 26 (paragraph 0026, pg. 7, ln. 3). Accordingly, reference numeral 36 at line 7 of paragraph 0027 associated with the piston pin has been amended to 26.

Paragraph 0032 has been amended to more accurately correspond to the embodiment illustrated in Figures 1 - 2. More specifically, lines 6 - 7 of paragraph 0032 have been amended to state that the coating 40 includes a surface area 44 and that the recesses 42 include sides 46 for defining pathways for the lubricant.

Attorney for applicants apologizes for these typographical errors.

Claim Rejections

35 U.S.C. § 102 - Anticipation

Claims 1, 10, 12 - 14, 16, and 17 were rejected under 35 U.S.C. § 102(b) as being anticipated by the Schenkel '865 patent. In addition, claims 11 and 15, which are ultimately dependent upon independent claims 1 and 12, respectively, were similarly rejected under § 103 as being unpatentable over the Schenkel '865 patent. In addition, claims 18 and 19 were rejected under 35 U.S.C. § 102(b) as being anticipated by the Wang et al. '844 patent. A claim is said to

be anticipated where each and every limitation of the claim can be found in a single prior art reference. Independent claims 1, 12, and 16 have been amended to more specifically describe the patterns defined by the plurality of recesses formed on the coating bonded to the skirt of the piston. In view of the amendments as explained in greater detail below, applicants respectfully submit that each and every limitation of the independent claims in this case cannot be found in either the Schenkel or Wang et al. references. The remaining claims are all ultimately dependent upon a respective one of the independent claims and add further perfecting limitations. Accordingly, these rejections are respectfully traversed.

The Prior Art

The Schenkel ‘865 Patent

The Schenkel ‘865 patent is directed toward a piston assembly 10 including an integral aluminum head 12 and skirt 14. The skirt 14 has an outer surface for engaging a cylinder wall. The outer surface of the skirt 14 includes a plurality of pointed ridges 24. Each of the pointed ridges is separated by a valley 26. The pointed ridges 24 extend annularly about the outer surface of the skirt 14 and are for engaging the cylinder. The ridges 24 and valleys 26 are coated with a fluorocarbon polymer. However, the Schenkel ‘865 patent neither discloses nor suggests a coating having a plurality of recesses *formed in the coating*. In addition, this patent neither discloses nor suggests that the plurality of recesses include a series of intersecting grooves extending across the outer circumference of the piston skirt at a predetermined angle. Finally, the Schenkel ‘865 patent neither discloses nor suggests that the plurality of recesses collectively define a chevron formation, as required in independent claim 1; a substantially hatch-like pattern as required in independent claim 12; nor a series of lubrication retaining discs disposed in uniformed spaced relation with respect to each other as required in independent claim 16.

The Wang et al. ‘844 Patent

The Wang et al. ‘844 patent is directed toward a piston and cylinder bore having an improved scuffing resistance. The piston assembly includes a piston body including a crown with a skirt extending from the crown. The skirt has an exterior surface. The exterior surface has a surface finish in a wave form with peaks and valleys such that it has a roughness total between approximately 6 and 8 micrometers. A composite coating is provided over the exterior surface. However, the Wang et al. ‘844 patent is silent as to the method of applying the predetermined coating to the piston. Accordingly, Wang et al. says nothing about directing a silk screen having a predetermined pattern in proximate relation to the outer surface of the piston skirt. This makes sense since Wang et al. does not appear to be concerned about the pattern of the coating applied to the piston. In addition, Wang et al. is also silent as to applying the coating to the outer surface of the piston skirt *through the silk screen to impart a predetermined pattern* to the coating as required in independent claim 18.

The Piston and Method of the Present Invention

In contrast to the Schenkel and Wang et al. patents, the present invention is directed toward a piston which is adapted for reciprocal movement within a cylinder of an internal combustion engine. The piston includes a body having a crown formed at the upper most margins of the body and the skirt depending from the crown and adapted for relative sliding motion with respect to the cylinder. The skirt includes an outer circumference having a major thrust side and a minor thrust side formed substantially opposite each other on the outer circumference of the skirt. A coating is bonded to the skirt so as to be juxtaposed between the skirt and the cylinder. The coating has a plurality of recesses formed thereon so as to define a predetermined pattern of recesses on the surface of the skirt. The plurality of recesses include a series of lubrication grooves extending across the outer circumference of the piston skirt at a

predetermined angle. As explained in claim 1, the grooves collectively define a chevron formation that act to operatively engage the lubricant between the skirt and the cylinder wall. As described in claim 12, the grooves define a substantially hatch-like pattern. In addition and as described in claim 16, the recess define a series of lubrication retaining discs disposed in uniform spaced relation with respect to each other.

Each of the groove patterns formed in the coating bonded to the skirt of the piston are manifested using the method of the present invention. More specifically, this method includes directing a silk screen having a predetermined pattern in proximate relation to the outer surface of the piston skirt. The coating is then applied to the outer surface of the piston skirt through the silk screen to impart the predetermined pattern.

Argument

In view of the clarification made to the language of independent claims 1, 12, and 16, applicants respectfully submit that the piston skirt having predetermined patterns of recesses in the form of grooves or retaining discs *formed in the coating* described in each of the claims is not disclosed or suggested by the Schenkel ‘865 patent. Indeed, Schenkel merely teaches V-shaped annular grooves *formed about the circumference of the piston skirt*. The skirt is then coated with a polymer *after* the grooves are formed on the surface of the skirt. The grooves taught by Schenkel also do not extend at any predetermined angle and do not form any specific pattern except that they are annularly disposed about the skirt.

Thus, the Schenkel ‘865 patent neither discloses nor suggests a plurality of recesses formed in the coating so as to define a predetermined pattern of recesses on the surface of the skirt. Similarly, Schenkel does not disclose or suggest that the recesses include a series of lubrication grooves extending across the outer circumference of the piston skirt at a

predetermined angle. Finally, the Schenkel ‘865 patent neither discloses nor suggests that the plurality of recesses collectively define a chevron formation, as required in independent claim 1; a substantially hatch-like pattern as required in independent claim 12; nor a series of lubrication retaining discs disposed in uniformed spaced relation with respect to each other as required in independent claim 16.

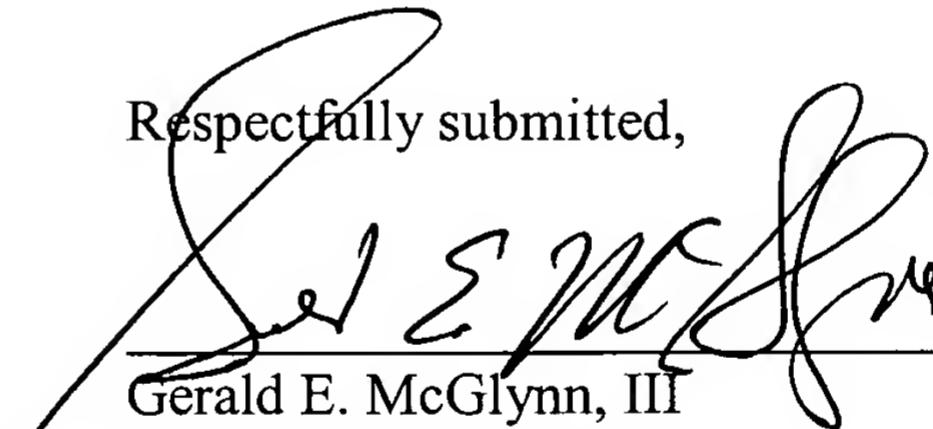
Similarly, applicants respectfully submit that the Wang et al. ‘844 patent does not disclose or suggest the method described in independent claim 18. Rather, Wang et al. merely discloses that the exterior surface of the piston skirt has a surface finish in a wave form that defines peaks and valleys so as to manifest a predetermined roughness. After the peaks and valleys are formed, a composite coating is provided over the exterior surface. However, the Wang et al. ‘844 patent teaches nothing about the manner in which the coating is applied. Wang et al. is silent as to any predetermined pattern that is imparted to the coating on the outer surface of the piston skirt and is therefore likewise silent regarding the use of a silk screen having a predetermined pattern through which the coating is applied to the exterior of the piston skirt.

There is simply no motivation provided in either the Schenkel ‘865 or Wang et al. ‘844 references to provide a piston having a skirt to which is bonded coating having a plurality of recesses so as to define a predetermined pattern on the surface of the skirt where the recesses further define a series of lubrication grooves extending across the outer circumference of the piston skirt at a predetermined angle so as to define predetermined formations in the coating thereon nor that the plurality of recesses define a series of lubrication retaining discs in uniform spaced relation with respect to each other. Similarly, there is no suggestion provided in either of the prior art references of record in this case for a method of applying a predetermined patterned coating to a piston using a silk screen and by applying the coating to the outer surface of the piston skirt through the silk screening to impart a predetermined pattern thereon.

In view of the above, it is respectfully submitted that independent claims 1, 12, 16, and 18 recite structure and method steps that are not disclosed or suggested by the prior art and that are patentably distinguishable from the subject matter of the references of record in this case. Dependent claims 2 - 11, 13 - 15, 17, and 19 are each ultimately dependent upon one of these independent claims and add further perfecting limitations. As such, the prior art references do not suggest the subject invention. However, even if they did, they could only be applied through hindsight after restructuring the disclosure of the prior art in view of applicants' invention. A rearrangement of the pistons described in these references to derive applicants' invention would, in and of itself, be an invention.

Conclusion

In view of the above, applicants respectfully submit that the claims, as amended, clearly distinguish over the prior art and are therefore allowable. Accordingly, applicants respectfully solicit the allowance of the claims pending in this case.

Respectfully submitted,

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